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The Investigation of the Viewpoint of Academic Staff and Graduate Students in Teaching Geometry in Elementary School

Nurten Bayrak [a*], Salim Yüce [b], Muzaffer Kaan Yüce [c]

[a]*Research Assistant, Yildiz Technical University, İstanbul, Turkey*
[b]*Professor, Yildiz Technical University, İstanbul, Turkey*
[c]*Student, Ihlas College, İstanbul, Turkey*

Abstract

Determination of the viewpoint of academic staff and graduate students in teaching geometry, which is an essential component of mathematics, has great importance. From this point of view, the aim of this study is to investigate views of academic staff and graduate students on methods such as technology, material, projects, teaching of arithmetic, abstraction and problem-solving in the teaching of geometry. The study was carried out on a total of 46 mathematicians, ranging from graduate students to professors. In order to describe the current situation, a screening model was used. A working group was asked 15 open ended questions to determine their views. Descriptive statistics of the analyzed data collected (arithmetic mean, standard deviation) were used. In addition to this, comparisons were made and the results were interpreted. Suggestions have been made on the basis of the data obtained at the end of the research.

Keywords: Academic Staff, Graduate Students, Screening Model

1. Introduction

The topic of geometry consists of geometric objects, shapes, their properties and their relationships (Toptaş, 2008). Children experience several situations related to geometry. Thus, these experiences that they are faced with are important (Burns, 2000). Geometry constitutes the most interesting and fun part of mathematics, as the teaching of it is like a game in the early ages, sustained as a puzzle and developed as a strong information cluster of intuition and concepts. As a result, it creates an opportunity to generate positive attitudes towards mathematics (Develi & Orbay, 2003). The teachers responsible for teaching geometry to children, with a certain level of experience, have significant tasks. Teachers have many responsibilities, such as creating activities in accordance with the individuals'

* Corresponding name:Nurten Bayrak. Tel.: +090-212-383-3108
E-mail address: nbayrak@yildiz.edu.tr

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level of experience, encouraging students to communicate with each other and themselves, stimulating collaboration and providing an environment in which they can express their questions and ideas clearly (Brooks & Brooks, 1999).

There are some studies in literature related to the perspective of teachers towards the use of technology in the teaching of geometry (Atav, Akkoyunlu & Sağlam, 2006; Pala, 2006; Kurtdede & Fidan, 2008; Balkı & Saban, 2009). There are also studies related to teachers' ideas about the different ways of teaching geometry (Bal, 2012; Temur, 2007). Generally, studies focus on the perspectives of pre-service teachers. There are very few studies in literature that investigate faculty members' and graduate students' perspectives on the teaching of geometry. This gives a special value to this study. The gap in literature will be filled, as the aim of this study is to investigate the perspectives of academicians' and graduate students' on the teaching of geometry at elementary level.

2. Methodology

A screening method was used in this study to analyze the actual situation (Yıldırım & Şimşek, 2005). This model application was used to analyze the existing perspectives about the teaching of geometry in universities. In this context, 46 people (professors, associate professors, assistant professors, research assistants and graduate students) majoring in mathematics and geometry were asked 15 open ended questions. The question topics consisted of technology, material, projects, the teaching of arithmetic, abstraction and problem-solving. In the first stage of this study, the answers of the questions were analyzed with respect to academic degrees. Thus, specific groups' ideas could be highlighted, which gave the opportunity to generate a framework relating to each group. In the second stage of the study, outstanding answers were examined with respect to questions. A general profile of each group was generated as a result of the investigation of these studies.

3. Findings

The analysis, using "yes – no" questions, gave rise to the following five tables of results. 'O' is given for NO and '100/number of individuals' is given for YES in results with respect to academic degrees.

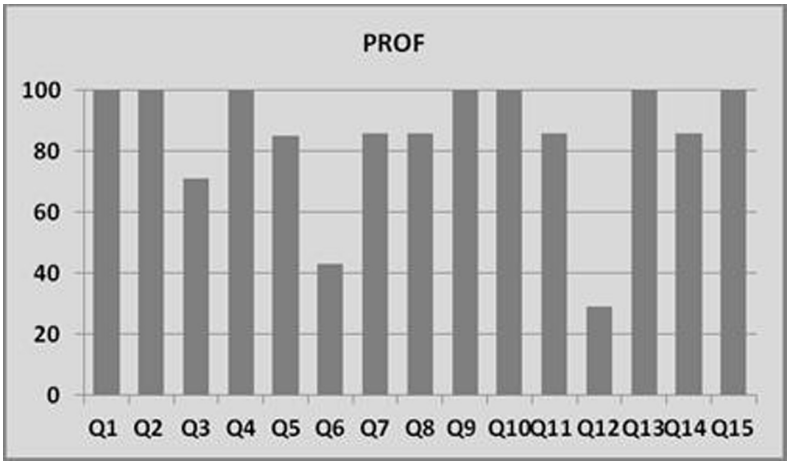

Figure 1: Positive answers of 7 Professors

Diverse answers can be seen as a result of the application, but the negative answers for questions 3, 6 and 12 from the majority of the respondents are observable in figure 1. The questions are; the importance of participating in national and international projects, the teaching of arithmetic should take precedence over the teaching of geometry and the narrowing of geometry topics in the actual curriculum. The professors' answers for the 6^{th} and 12^{th} questions

are as expected. However, the negative answers professors gave about the importance of participating in national and international projects are interesting.

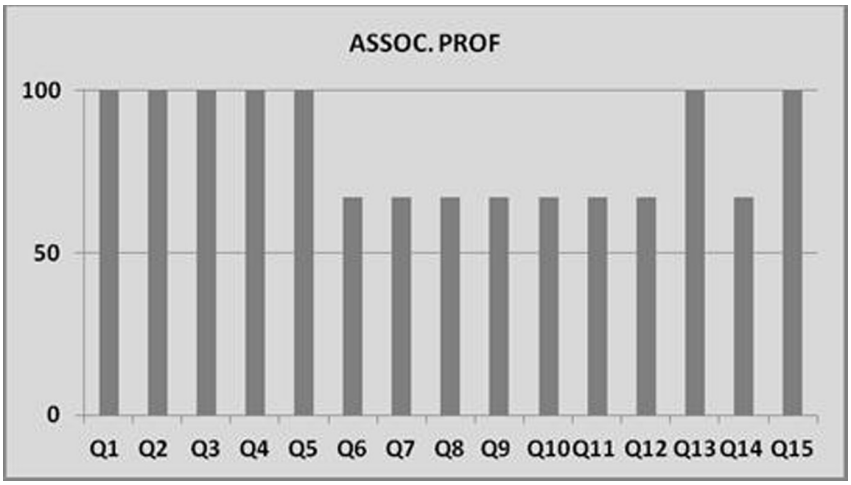

Figure 2: Positive answers of 3 Associate Professors

When the table above is investigated, it can be seen that they is a general tendency and positive answers for specific questions. Ten per cent of the answers for questions 1-5 and questions 13 and 15 are positive. Thus, associate professors have a 100 % positive attitude towards technology and material usage and the positive role of geometry. They have a 67 % positive attitude about other issues.

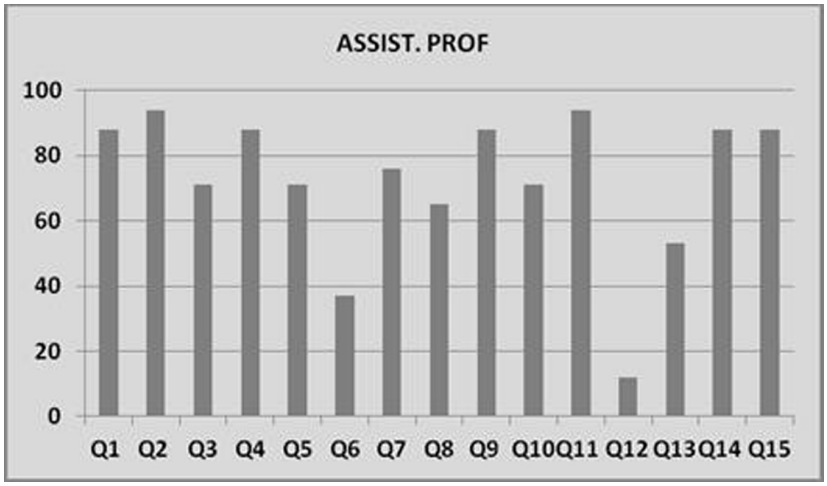

Figure 3: Positive answers of 17 Assistant Professors

When figure 3 is analyzed, distinctive differences can be seen. They generally answered the 6^{th} and 12^{th} questions with a negative response, but they have very diverse answers for the rest of the questions. 37% of assistant professors think that the teaching of arithmetic should take precedence over the teaching of geometry. This ratio can be interpreted as such; they think that the teaching of arithmetic is a necessity for success in geometry. They also see the narrowing of the actual topics of the curriculum as a wrong decision, by the same ratio.

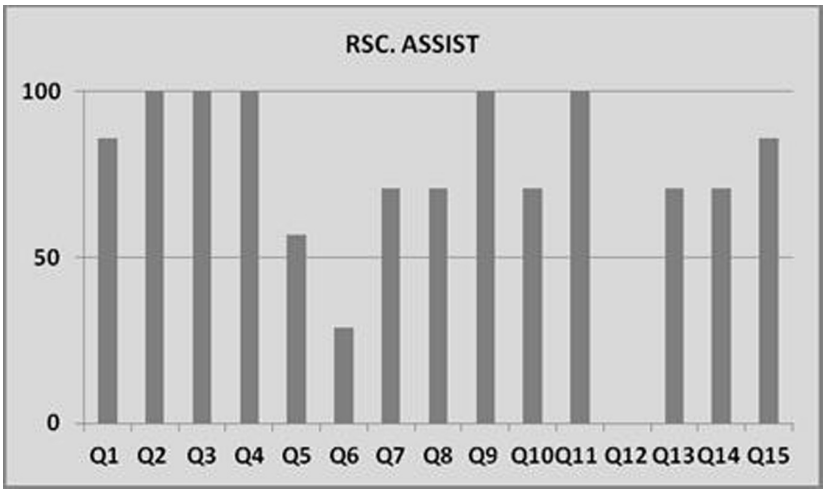

Figure 4**:** Positive answers of 7 Research Assistants

In Figure 4, the strongest answer is the 100% positive answer of research assistants for the 12th question. In other words, they regard the narrowing the topics of the actual curriculum as a mistake. It can also be inferred that they think the existing curriculum is not sufficient.

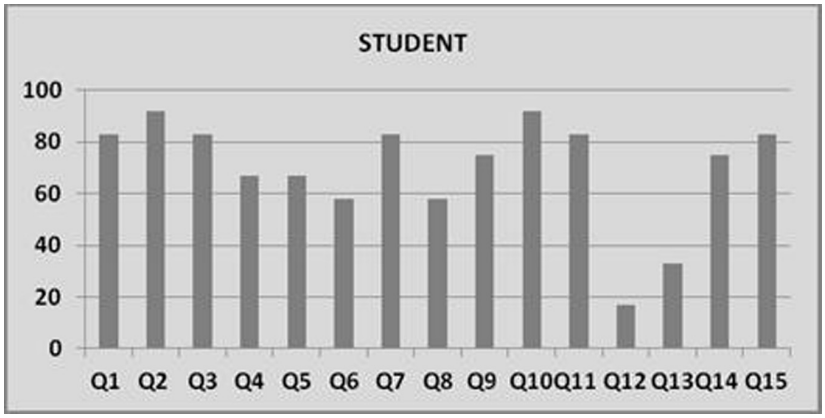

Figure 5: Positive answers of 12 Graduate students

The table above shows diverse results, but a general positive tendency is also observable. Questions 12 and 13 were answered negatively as in previous results.

4. Conclusions and Recommendations

Figure 6 shows the perspectives of academicians and graduate students towards the teaching of geometry at elementary level, with their answers to 15 open ended questions. The questions have many different answers and are investigated in the table of results below.

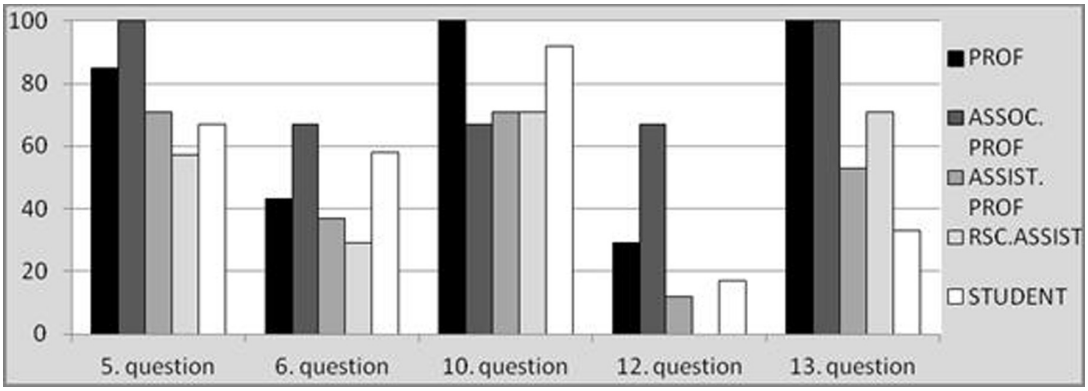

Figure 6: The perspectives of academicians and graduate students

Results generated from the table are listed below:

The fifth question, 'do you agree that geometry is being used in other courses at elementary level', was answered 100% positively by associate professors and by 57 % of research assistants. This result indicates that research assistants think geometry topics should be integrated more widely into other courses than at present. The 6th question; 'should the teaching of arithmetic take precedence over the teaching of geometry' received less positive answers than the 5th question. 67 % of associate professors agreed and 71 % of research assistants did not agree with the question.Thus, associate professors and research assistants have differing views about this issue.

The 10th question; 'should the teaching of geometry start with the identification stage and go through to the abstraction stage at elementary level' was answered positively by all mathematicians. However, associate professors presented a less positive attitude than the rest of the respondents. Question 12; 'do you think it is necessary to narrow down the topics of geometry in the actual elementary curriculum' was the most divisive question in the study. 67 % of associate professors agreed and 100% of research assistants did not agree with the question. It is possible to say that new research encourages research assistants. Professors and associate professors agreed 100 % with the 13th question, 'concept based education should be considered rather than symbolic presentations in the teaching of geometry at elementary level'. However, 67 % of graduate students did not agree, meaning that students believe that symbolic presentations are important in the teaching of geometry.

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